Virginia Beach HRPDC Grant Project

HRPDC REC Meeting

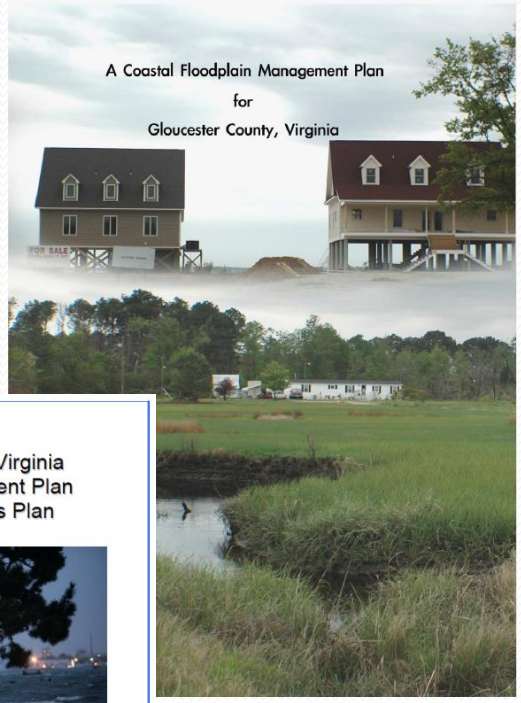
August 7, 2014

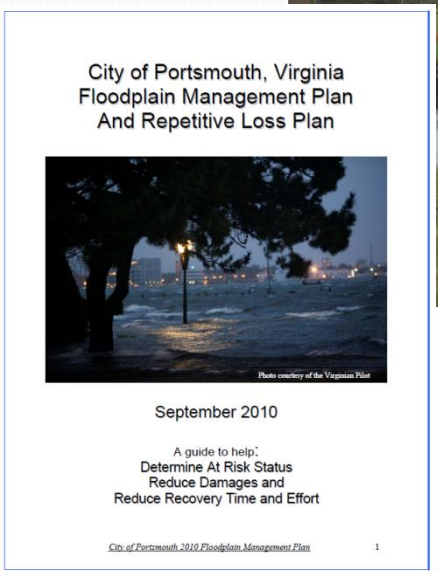
What Virginia Beach Has Done

- Floodplain Ordinance
- Floodplain Workgroup
- Comprehensive Plan
- University of Virginia Institute for Environmental Negotiation Listening Sessions and Focus Group
- Beach Nourishment, engineering, home elevation, GIS mapping

What Other Localities in Virginia Have Done

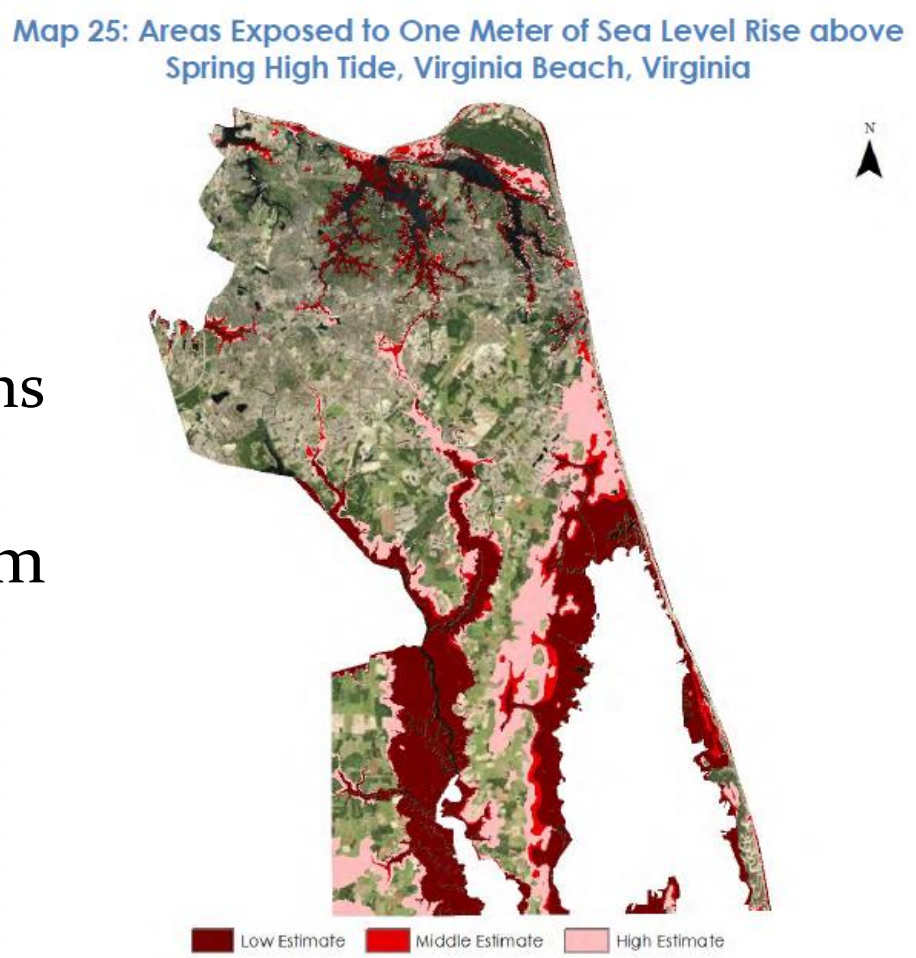
- Community Rating System
- Local Floodplain Management Plans
- Floodplain Ordinance
  - Freeboard
  - Other higher standards





Other Efforts Across the State

- HRPDC
  - Technical reports
  - GIS data analysis
  - Educational presentations and events
- Community Rating System Workgroup
- Adaptation Forum
- Non-profit groups



Local University Efforts

- Virginia Institute of Marine Science
- Old Dominion University – Mitigation and Adaptation Research Institute
- Virginia Coastal Policy Clinic

State Efforts

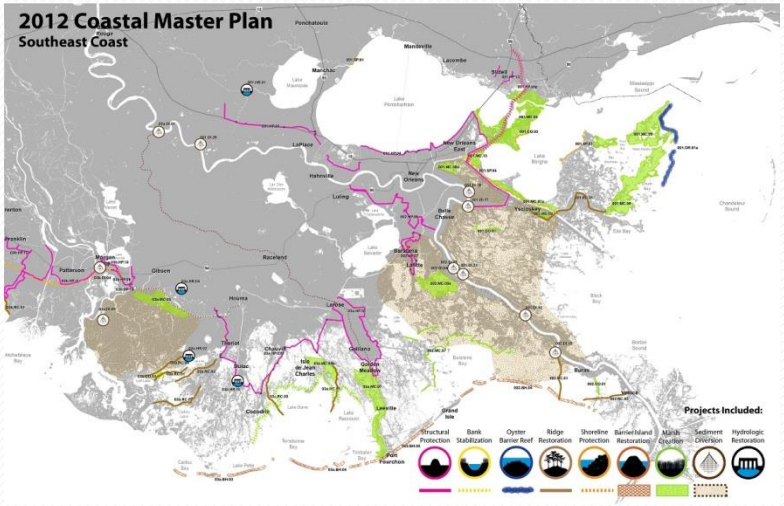
- Coastal Zone Management Program
- House Joint Resolution No. 50
- House Joint Resolution No. 16
- Governor's Commission on Climate Change
- Secure Commonwealth Panel – Recurrent Flooding Sub-Panel

Case Studies

- Chance to see what is going on outside of Virginia
- Way to garner ideas
- Report includes
  - Review of the Plan/Program
  - Key Points
  - Applications for Virginia Beach

State of Louisiana Coastal Master Plan

- Designated state organization in charge of coastal protection and restoration
- Projects use a 50 year planning horizon that is updated every 5 years
- Projects tied to funding and are balanced between reducing flood risk and building land

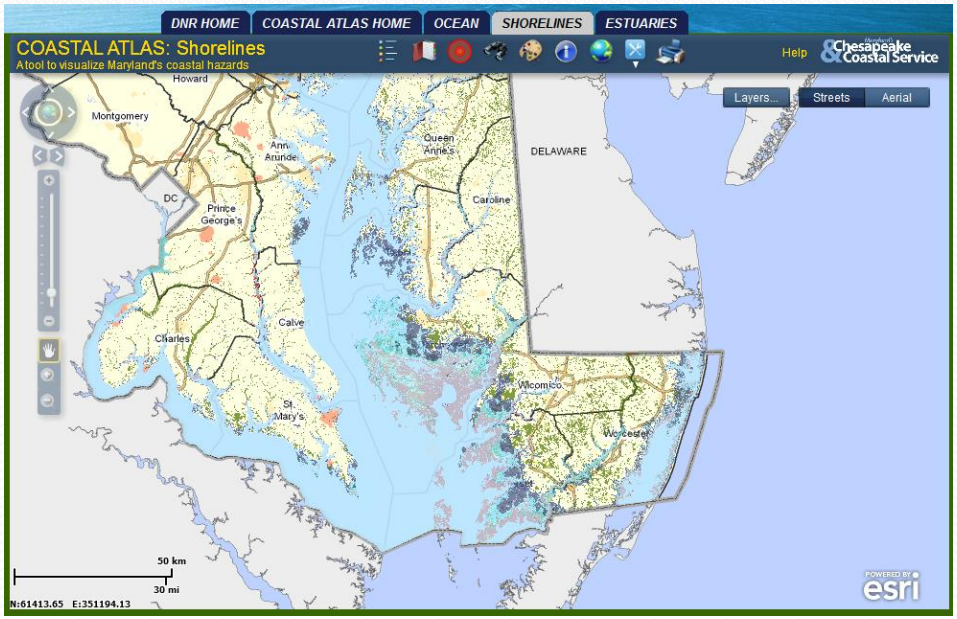


State of Louisiana - Takeaways

- Better suited to state government
- Planning horizon and update schedule would compliment existing planning framework
- Tied all proposed projects to projected impacts, cost benefit analysis, and anticipated funding
  - Fits with the range of communities and environments that will be impacted by SLR in Virginia Beach

State of Maryland

- *A Sea Level Rise Response Strategy for the State of Maryland*
- Efforts in Maryland are housed in a central state agency, Maryland Department of Natural Resources
- The *CoastSmart* Communities Program



State of Maryland - Takeaways

- Many products, guidance documents, and tools have been designed for local government use
- Capability to use existing GIS layers and build new ones to develop a product similar to the Maryland Coastal Atlas

Guilford, Connecticut

- Used the Nature Conservancy's Coastal Resilience Program
- Series of three reports
  - The Risk and Vulnerability Assessment Report
  - The Report of Options to Increase Coastal Resilience
  - The Coastal Resilience Plan
- Similar process/approach to Virginia Beach – this will be a great guide moving forward.

Boston, Massachusetts

- Climate Change Preparedness and Resiliency Guidelines
- Climate Change Resiliency and Preparedness Checklist

Boston, Massachusetts Takeaways

- The Climate Change Checklist may be a good way to evaluate proposed development projects
- Checklist addresses multiple areas
- Dillon's Rule authority questions

San Francisco Bay Conservation and Development Commission

- San Francisco Bay Conservation and Development Commission developed the Bay Plan
- Amendment to the Bay Plan in 2011 incorporated climate change and established a new section
- Require developers to assess the risks that projects may face from flooding and sea level rise

San Francisco Bay Conservation and Development Commission - Takeaways

- Directly connects findings with policies
- Mandates that projects address sea level rise risks
- Includes other adaptation actions
- Could serve as a template to incorporate SLR into existing floodplain regulations.

Broward County, Florida

- Florida passed legislation authorizing localities to designate Adaptation Action Areas
- Southeast Florida Regional Climate Change Compact analyses
- Broward County, Florida has adopted a Climate Change Element and Support Document as part of its Comprehensive Plan to guide the County's climate change adaptation efforts.

Broward County, Florida Takeaways

- Model to incorporate climate change impacts into the comprehensive plan
- Many of the analyses used already exist, and could be easily incorporated in the comprehensive plan
- Need to determine whether a city has the authority to designate “Adaptation Action Areas”

Identification of Critical Infrastructure

- Worked with GIS and Emergency Management
- Reviewed the Critical Sectors in the National Infrastructure Protection Plan
- Reviewed by the City's Floodplain Workgroup
- Reviewed to determine which types of critical infrastructure had existing GIS data.

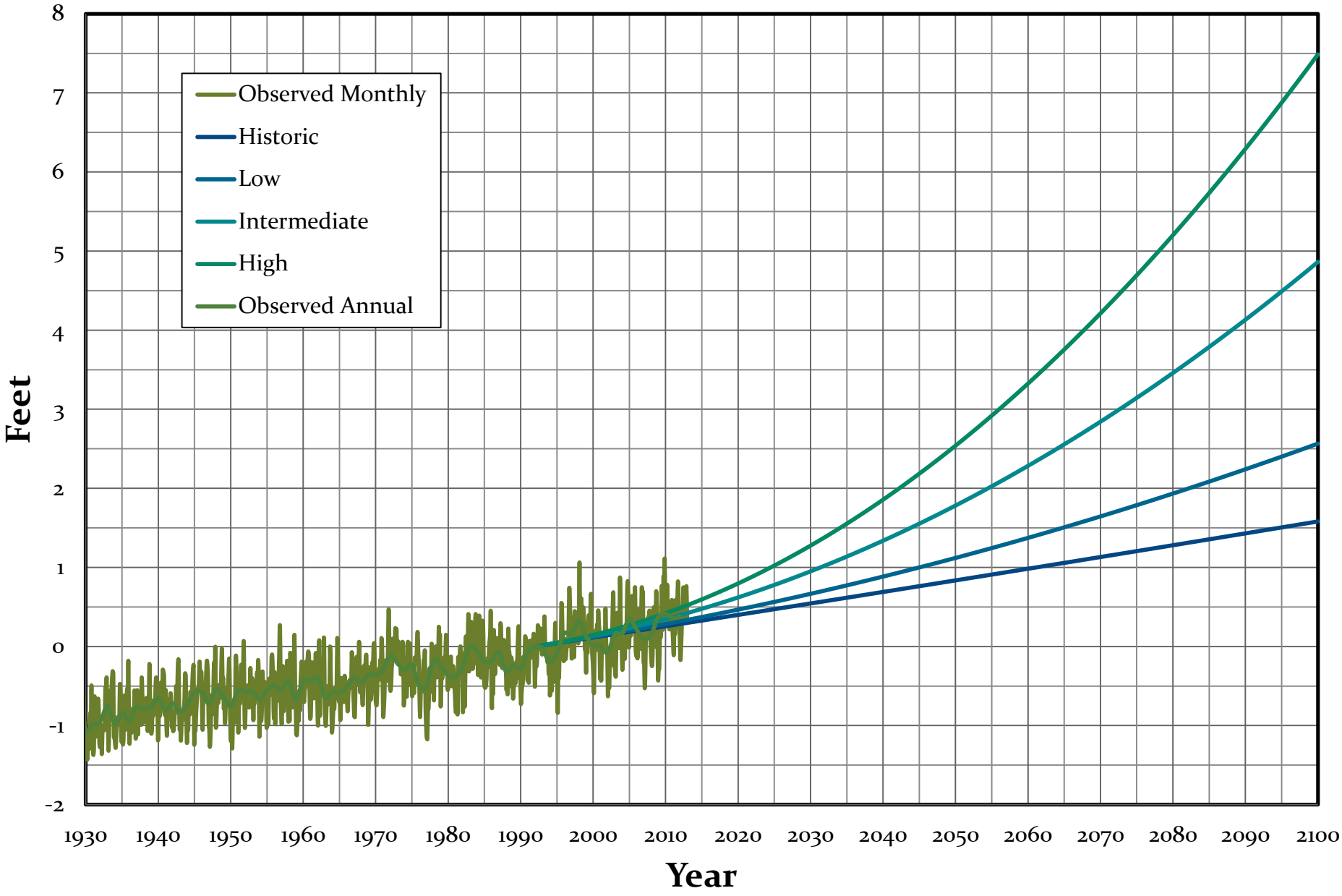
Prioritization of Critical Infrastructure

Infrastructure Name	Public/Private	ASCE Risk Category	Hazard Plan	Priority
911 Radio Coverage's	Public	IV	Y	1
Chemical Storage	Public/Private	IV	Y	1
Emergency Shelters	Public	IV	Y	1
EMS Stations	Public	IV	Y	1
EOC's	Public	IV	Y	1
Fire Stations	Public	IV	Y	1
Hospitals	Private	IV	Y	1
Police Stations	Public	IV	Y	1
Boardwalk	Public	IV	N	2
Bridges and Approaches	Public	IV	N	2
Cell Towers	Private	III	Y	2
Electrical Distribution	Private	III	Y	2
Highways/Evacuation Routes	Public	IV	N	2
Natural Gas Distribution	Private	III	Y	2
Oil Distribution/Pipelines	Private	III	Y	2
Sanitary Sewer	Public	III	Y	2
Septic Systems	Private	III	Y	2
Tunnels and Approaches	Public	IV	N	2
Urgent Care Centers	Private	III	Y	2
Water Distribution	Public	III	Y	2
Wells - Commercial	Private	III	Y	2
Wells - Private	Private	III	Y	2
Animal Shelters	Public/Private	III	N	3
Banks/ATMs	Private	III	N	3
Colleges and Trade Schools	Private	III	N	3
Data Storage Centers	Public	III	N	3

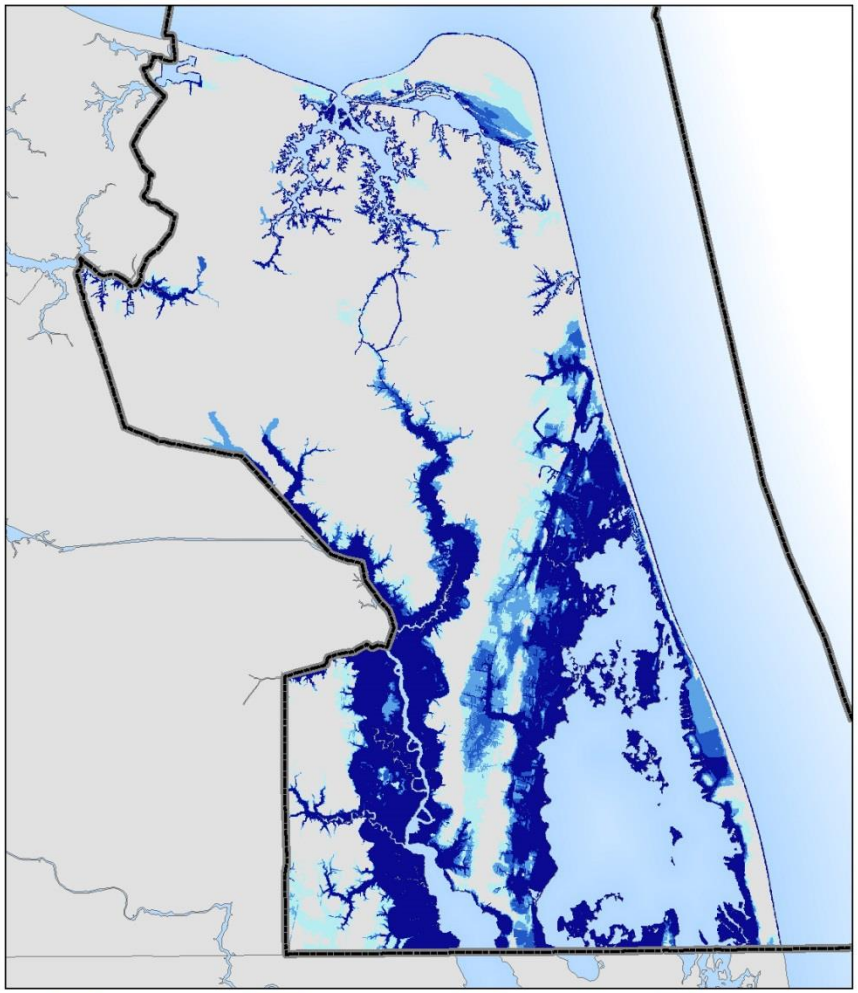
Maps

- Need to take both sea level rise and flooding into account for effective public planning
- Use GIS analysis to map areas vulnerable to sea level rise and areas vulnerable to flooding from storm surge over time
  - "Present"
  - 2025
  - 2050
  - 2075
  - 2100
- Based on intermediate SLR projection from NCA and SLOSH storm surge models (Categories 1, 2, 3, and 4)

Observed and Projected Relative Sea Level Change at Sewells Point Tide Gauge, Norfolk, VA (1930-2100)



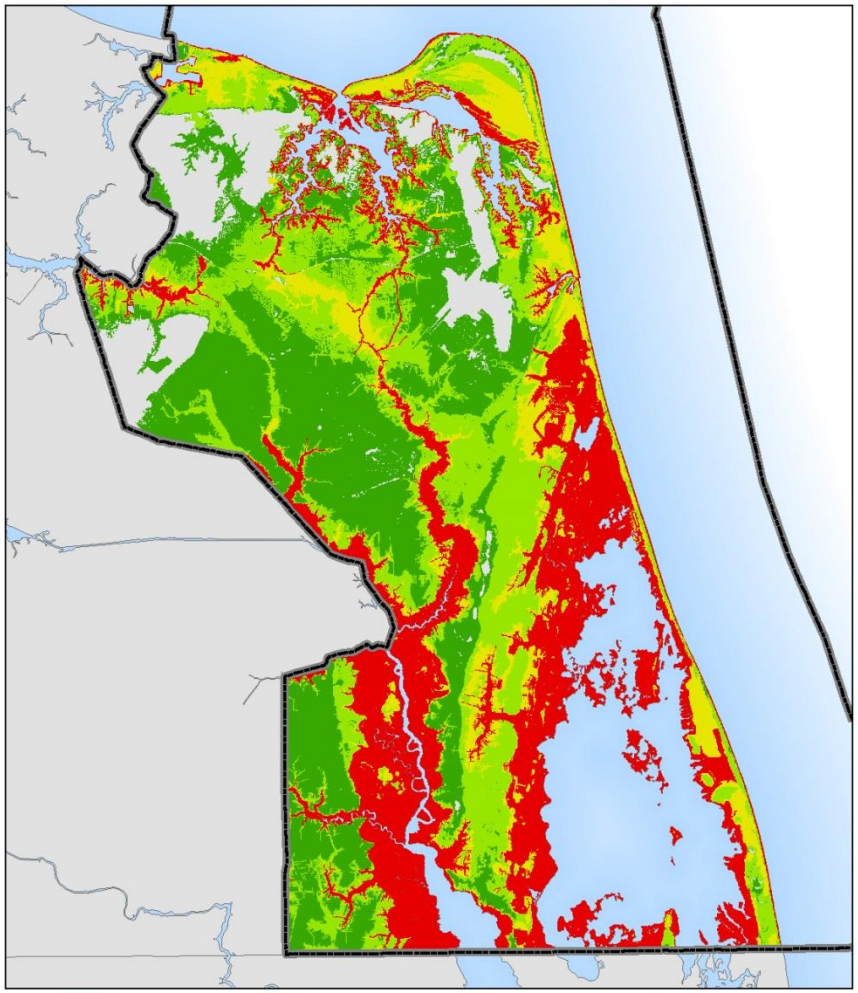
Map 1: Areas in Virginia Beach Potentially Vulnerable to Sea Level Rise



2025 (0.8') 2050 (1.8') 2075 (3.1') 2100 (4.9')

Areas identified as vulnerable to sea level rise are based on projections of relative sea level rise for the Sewell's Point tide gauge in Norfolk, Virginia, which were calculated using the intermediate sea level rise scenario developed for the 2013 National Climate Assessment. This map is for illustrative purposes only and should not be used for site planning or evacuation decisions. During actual storm events, residents should follow instructions from local and state emergency management officials.

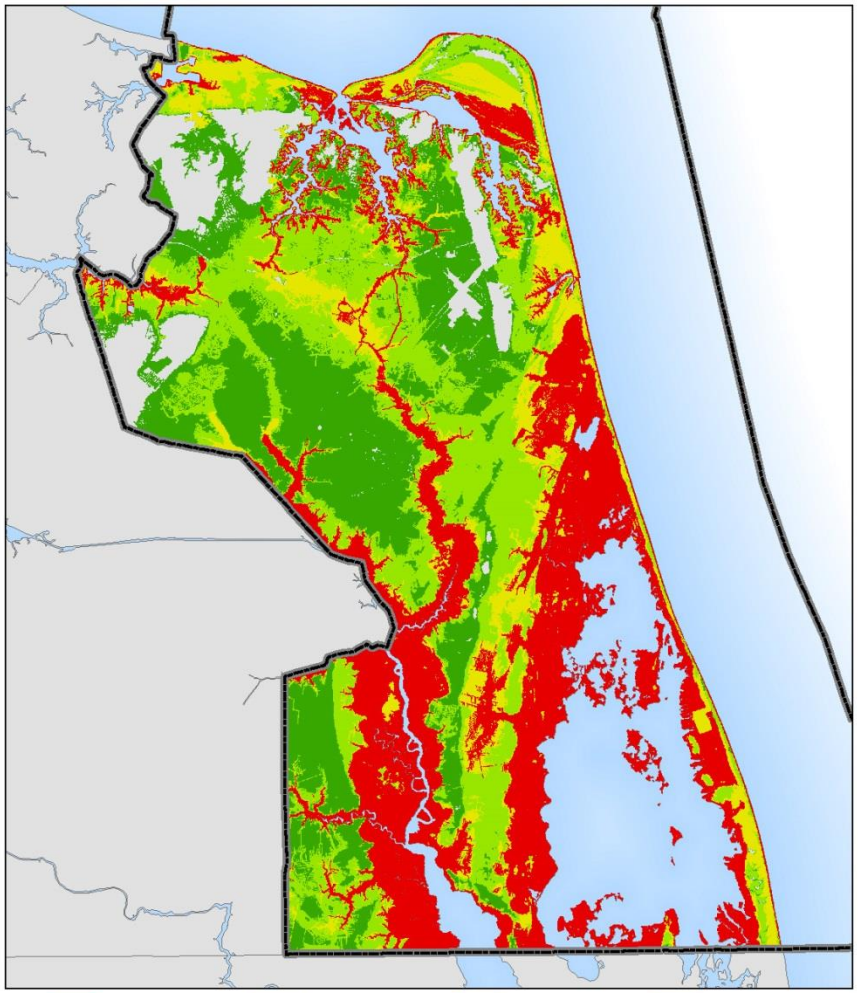
Map 2: Areas in Virginia Beach Currently Vulnerable to Storm Surge



Category 1 Category 2 Category 3 Category 4

Areas identified as vulnerable to storm surge are based on results from the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model developed by the National Weather Surface for the Norfolk SLOSH Basin. This map is for illustrative purposes only and should not be used for site planning or evacuation decisions. During actual storm events, residents should follow instructions from local and state emergency management officials.

Map 3: Areas in Virginia Beach Vulnerable to Storm Surge in 2025



Category 1 | Category 2 | Category 3 | Category 4

Areas identified as vulnerable to storm surge are based on results from the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model developed by the National Weather Surface for the Norfolk SLOSH Basin at high tide, combined with projected relative sea level rise of 0.8 feet, based on the intermediate sea level rise scenario developed for the 2013 National Climate Assessment. This map is for illustrative purposes only and should not be used for site planning or evacuation decisions. During actual storm events, residents should follow instructions from local and state emergency management officials.

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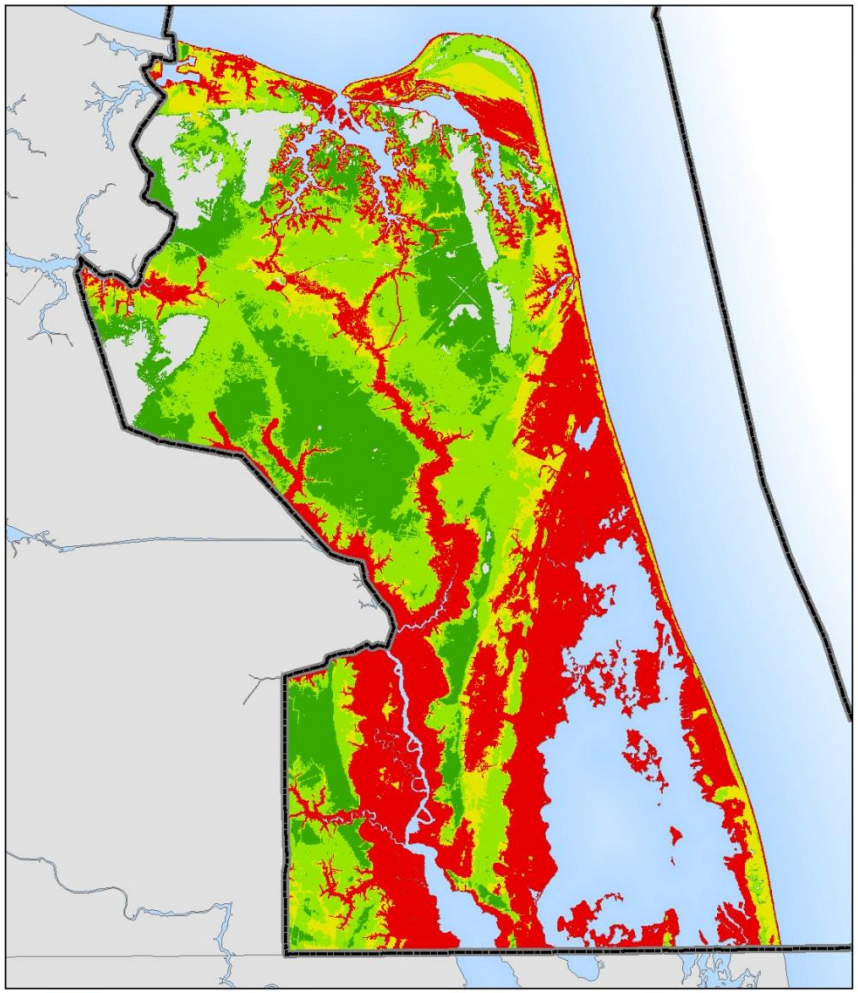
Map 4: Areas in Virginia Beach Vulnerable to Storm Surge in 2050



Category 1 | Category 2 | Category 3 | Category 4

Areas identified as vulnerable to storm surge are based on results from the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model developed by the National Weather Surface for the Norfolk SLOSH Basin at high tide, combined with projected relative sea level rise of 1.8 feet, based on the intermediate sea level rise scenario developed for the 2013 National Climate Assessment. This map is for illustrative purposes only and should not be used for site planning or evacuation decisions. During actual storm events, residents should follow instructions from local and state emergency management officials.

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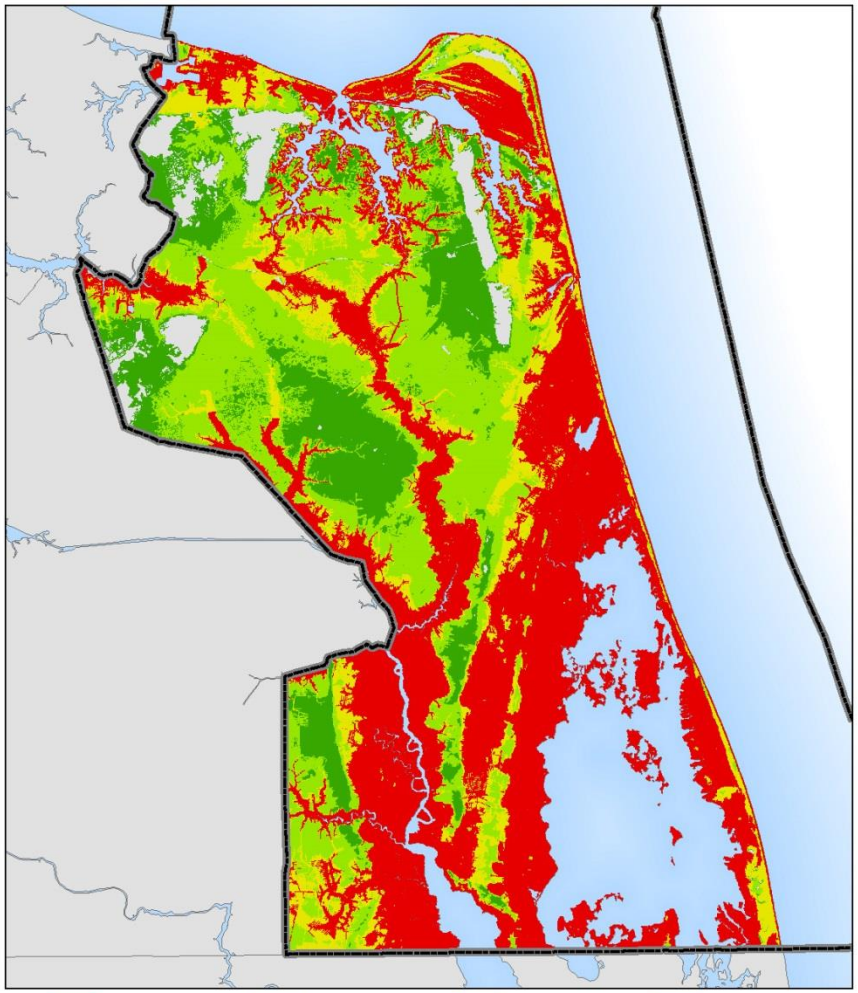
Map 5: Areas in Virginia Beach Vulnerable to Storm Surge in 2075



Category 1 Category 2 Category 3 Category 4

Areas identified as vulnerable to storm surge are based on results from the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model developed by the National Weather Surface for the Norfolk SLOSH Basin at high tide, combined with projected relative sea level rise of 3.1 feet, based on the intermediate sea level rise scenario developed for the 2013 National Climate Assessment. This map is for illustrative purposes only and should not be used for site planning or evacuation decisions. During actual storm events, residents should follow instructions from local and state emergency management officials.

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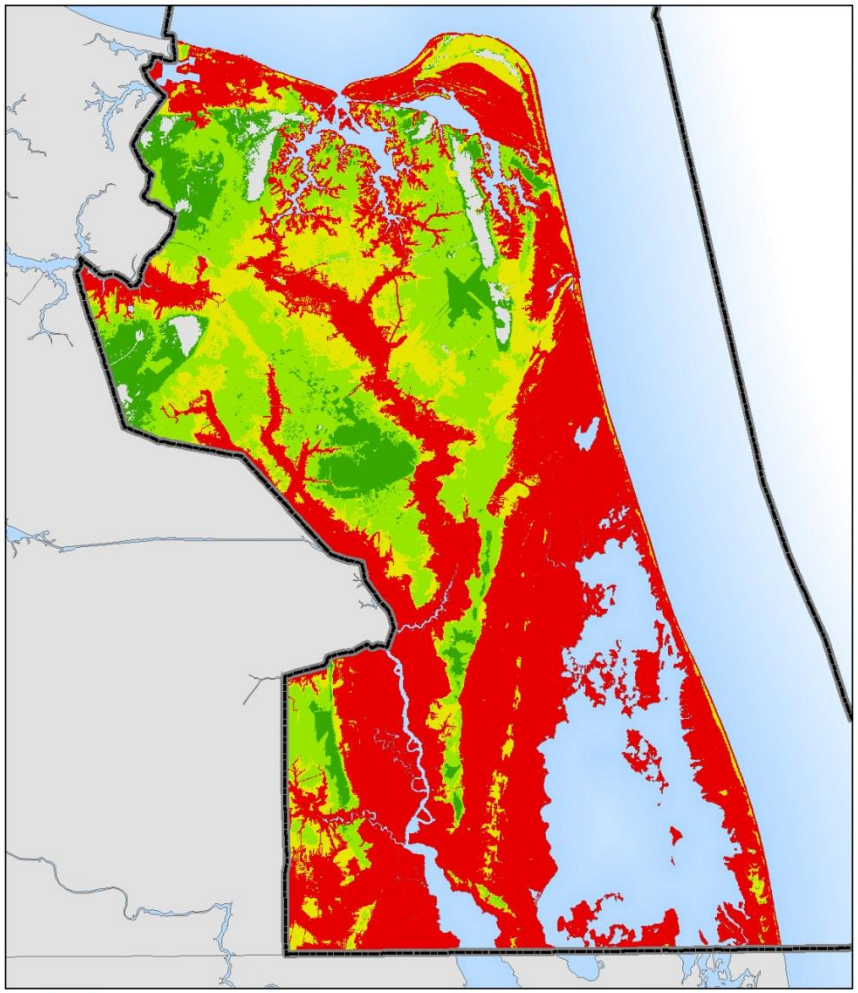
Map 6: Areas in Virginia Beach Vulnerable to Storm Surge in 2100



Category 1 Category 2 Category 3 Category 4

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Mapping

- Potential Uses:
  - Vulnerability Assessments
  - Project Development
  - Zoning
  - Infrastructure planning and policies

Communications and Outreach

- While a lot of work has been done to assess the risks and develop ways to mitigate SLR, little has been done to inform and engage the public
- Development of a Citizen Advocacy Academy
- Comprehensive Plan Outreach
- Education of Boards, Committees, and Local Groups (Inreach)

Communications and Outreach Materials

- Maps
- Handouts
- Speaker Presentations
- Websites and Mobile Apps
- Social Media

Next Steps

- Applied for further CZM funding to implement Community Outreach Plan
- Sea Level Rise Study
- Emergency Management will continue to work with GIS on critical infrastructure data
  - Locations of buildings
  - Overlay with GIS to determine what is at risk